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Patient readmission and support utilization following anterior temporal lobectomy

SARAH J. WILSON[*,†], PENNY KINCADE[*,‡], MICHAEL M. SALING[*,†] & PETER F. BLADIN[*,§]

[*] *Comprehensive Epilepsy Programme, Departments of* [†] *Neuropsychology,* [‡] *Nursing and* [§] *Neurology, Austin & Repatriation Medical Centre, Victoria, Australia*

Correspondence to: Dr Sarah J. Wilson, Department of Neuropsychology, Austin & Repatriation Medical Centre, Studley Road, Heidelberg 3084, Victoria, Australia

The aim of this study was to examine factors precipitating patient readmission, following anterior temporal lobectomy (ATL) for refractory epilepsy. A second aim was to explore the use of hospital outpatient and community support services ('outpatient services') by this patient population. These aims served the more general goal of identifying patients most likely in need of services additional to those routinely provided by our Seizure Surgery Follow-up and Rehabilitation Programme. The medical records of 100 consecutive ATL patients were retrospectively examined for the incidence and diagnoses precipitating acute readmission, and the utilization of additional outpatient services. Twenty-one patients (21%) required readmission post-ATL, totalling 47 readmissions between them. Psychiatric diagnoses were the most prevalent (53%), including anxiety, depression and/or post-ictal psychosis. Epileptological diagnoses were the other main precipitant (28%). Additional outpatient services were predominantly utilized for ongoing psychological support. Of the 21 patients requiring readmission, 10 (10%) also needed additional outpatient services. These patients were predominantly female or unemployed, in contrast to male or employed patients who tended to require readmission only. Seventeen patients (17%) were maintained within the community using additional outpatient services only. Characteristics of these patients included disrupted family dynamics, limited social networks, and/or a psychiatric history. These patients were also more frequently beyond the 24-month follow-up period of the programme. A profile of patients most in need of additional support services can be constructed to assist team planning of proactive management strategies for the rehabilitation phase of ATL.

Key words: post-operative readmission; psychosocial rehabilitation; anterior temporal lobectomy; temporal lobe epilepsy; surgical outcome; seizure outcome.

INTRODUCTION

Few studies have examined the incidence or reasons underlying patient readmission following therapeutic neurosurgical treatment of intractable focal epilepsies. Nor has the utilization of outpatient services by these patients been examined in the post-operative phase. This is somewhat surprising given the obvious impact that these factors have on the resources of a health care system[1–4].

Research in other fields[5–8] examining acute patient readmission has varied according to the type of medical condition (acute vs. chronic), the patient sample size (50–12 000 patients), the length of follow-up (6 months–5 years), and the number of research centres involved (single vs. multi-centre). Despite this methodological diversity, the data have shown two main findings. Both the psychological status of the patient and the absence of family, community, and/or professional support services contribute to the number of patient readmissions and the number of support services accessed by each patient.

It has been previously well noted that a period of psychosocial adjustment follows surgery for intractable epilepsy[9–11]. Optimal seizure relief does not automatically entail psychosocial benefits for the patient. Patients must learn to discard roles associated with chronic epilepsy. This can be accompanied by new expectations being placed upon them by themselves, their families, and their community. Quality patient care should aim to identify those patients most likely to experience adjustment difficulties post-surgery, so that proactive management strategies can be implemented. This serves the larger goal of maximizing patient outcome.

The purpose of this study was to examine the incidence and reasons for patient readmission post-ATL, as well as the use of outpatient services. We aimed to

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Table 1: Charactistics of the patient sample.

Characteristic	Distribution ($N = 100$)
Sex	
Males	44
Females	56
Mean age (range)	35.0(8.1–62.3 years)
Employment status[a]	
Employed	49
Unemployed	41
Marital status[a]	
Single	54
De facto relationship/Married	36
Side of epileptogenic focus[b]	
Left	64
Right	36
Length of post-operative follow-up	
$\leq$ 24 months	52
$>$ 24 months	48
Post-operative seizure outcome	
No seizures/auras only	76
CPS &/or GTCS[c]	24

[a] Children under 18 years are not included in these data.
[b] Site and side of epileptogenic focus were determined according to the method outlined by Bladin[9].
[c] These patients experienced complex partial seizures and/or generalized tonic–clonic seizures post-surgery.

describe the characteristics of patients most likely in need of additional support. The results will be considered in relation to the services routinely provided by our Seizure Surgery Follow-up and Rehabilitation Programme. Our team comprises consultant neurologists, neuropsychologists, epilepsy nurse clinicians, and liaison psychiatry, as well as representatives from state and federal employment services.

MATERIALS AND METHODS

Subjects

One hundred consecutive patients were retrospectively studied from the Seizure Surgery Follow-up and Rehabilitation Programme of the Austin & Repatriation Medical Centre. All patients had undergone ATL for the control of refractory complex partial seizures of temporal lobe origin, according to the pre-operative protocol and surgical technique previously described[11, 12]. The data spanned a period of 4 years, 1 month (October 1992–September 1996), and were generated as part of the routine protocol of the Programme. The characteristics of the patient sample are presented in Table 1.

Procedure

The medical and psychosocial records of the 100 patients were examined to identify those requiring readmission to the acute hospital system and/or use of outpatient services. The latter included hospital outpatient and community support services additional to those routinely provided by the Seizure Surgery Follow-up and Rehabilitation Programme. The *routine* programme involves regular review by medical and neuropsychological staff at discharge, and 1, 3, 6, 12, and 24 months post-operatively. Phone follow-up is conducted between these reviews by specialized nursing staff for ongoing monitoring (see also refs 9 and 11 for further details). Services *additional* to this included ongoing hospital-based counselling, local community psychiatric or psychological support, and/or vocational counselling and retraining. Use of additional services was documented from outpatient notes and correspondence with service providers within the community.

The characteristics of patients requiring post-operative readmission and/or additional outpatient services were examined across a broad range of variables. These variables were coded according to a standard protocol, which documented the incidence of demographic, epileptological, psychiatric and social factors. The data were used to generate a profile of patients most likely to benefit from proactive health care management.

RESULTS

Table 2 displays the number of readmissions post-ATL for the sample of 100 patients, expressed as a function of patient diagnosis at the time of readmission. Overall, 21 patients (21%) required readmission, with a total of 47 readmissions between them. Of these, 11 patients (11%) required readmission only (16 readmissions in total), whilst 10 patients (10%) required both readmission and additional outpatient services (31 readmissions in total). In this latter subgroup, one patient required 14 separate readmissions for post-ictal psychosis. This was considerably above the average number of readmissions for the other 20 patients (1.65 readmissions per patient).

The most frequent reason for patient readmission post-ATL, with or without additional outpatient services, related to psychiatric diagnoses of anxiety, depression and/or post-ictal psychosis (53%). Twenty-one percent (21%) occurred specifically for anxiety and/or depression, with patients typically requiring additional services as well as readmission. The second reason for patient readmission was medical management of epileptological factors (28%). Readmission for complications of surgery (9%), and for non-related medical issues (11%) occurred infrequently. Seventeen of the 100 patients (17%) were maintained within the community through the utilization of additional outpatient services only (refer to Table 3). Patients predominantly accessed these services for ongoing psychological support.

Table 2: Number of readmissions post-ATL as a function of diagnosis.

Readmission diagnosis	Readmission only ($n = 16$)	Readmission and outpatient services[a] ($n = 31$)	Total ($n = 47$)
Psychiatric			25 (53%)
Anxiety/Depression	2	8	
Post-ictal psychosis	1	14	
Epileptological			13 (28%)
Seizures for stabilization	2	5	
Seizures for characterization	4	2	
Surgical			4 (9%)
Post-operative complications	3	1	
Non-related medical conditions	4	1	5 (11%)

[a]Hospital outpatient and community support services additional to those routinely provided by the Seizure Surgery Follow-up and Rehabilitation Programme.

The characteristics of patients requiring readmission and/or additional outpatient services ($N = 38$; Table 3) were compared to the characteristics of the larger patient sample ($N = 100$; Table 1), to develop a profile predictive of patients in need of additional support. This revealed that there was a greater percentage of males in the readmission only group (64%), and a greater percentage of females requiring both readmission and additional outpatient services (80%), compared to the approximately equal distribution of males (44%) and females (56%) in the larger sample. Similarly, there was a greater percentage of employed patients requiring readmission only (73%), and a greater percentage of unemployed patients requiring both readmission and additional outpatient services (80%), compared to the approximately equal distribution of employed (49%) and unemployed (41%) patients in the larger sample.

Length of post-operative follow-up was evenly distributed for the larger sample (Table 1), between patients within 24 months of surgery (52%) and patients beyond this period (48%). In contrast, there was an increased frequency of patients beyond the 24-month post-operative period who required additional outpatient services (82%; Table 3).

Finally, only a small percentage of patients experienced post-operative complex partial and/or generalized tonic–clonic seizures (24%) within the sample of 100 patients (Table 1). In contrast, there was a generally increased representation of these patients (39%) within the sample requiring post-operative readmission and/or additional outpatient services (Table 3).

There appeared to be minimal differences between the distributions of single and married/de facto patients within the smaller and larger samples. This was also true for patient age, and the distribution of patients with left- or right-sided epileptogenic foci.

In summary, patients most likely to require readmission only post-ATL tended to be male (64%) or employed (73%), whilst patients requiring *both* readmission and additional outpatient services were predominantly female (80%) or unemployed (80%). Use of additional outpatient services only was frequently required by patients beyond the 24-month post-operative period (82%). Patients experiencing post-operative seizures generally required more post-operative support, regardless of type (readmission and/or additional outpatient services).

To distinguish further between patients requiring readmission post-ATL and those requiring additional outpatient services, three more variables pertaining to psychiatric, family, and social factors were examined. These were chosen on the basis of their significance in other patient populations[6–8], as well as their relevance to patients with epilepsy[9, 10, 13, 14]. The results are displayed in Table 4.

In the larger sample of 100 patients, 17% had a history of previously diagnosed psychiatric illness. These patients were considerably more likely to require additional outpatient services post-ATL (41%), compared with readmission (24%). Fifteen percent (15%) of patients reported difficulties due to disrupted family dynamics post-ATL. These patients were also more likely to utilize additional outpatient services (47%), rather than requiring readmission (26.5%). Finally, 20% of patients in the larger sample experienced limited social support. These patients more frequently required additional outpatient services (47%), compared with readmission (23%). As much as one third of the patients with a psychiatric history, disrupted family dynamics and/or limited social support required both readmission and additional outpatient services.

DISCUSSION

The findings of the present study concur with those reported in previous literature. Two of the main factors influencing readmission and/or the use of additional outpatient services in our sample included the post-operative psychological status of the patient, and limited social support[5–8].

Psychological issues were the main reason for readmission and/or the use of additional outpatient services. This may partly reflect the magnitude of psychologi-

Table 3: Characteristics of the patients requiring readmission and/or additional outpatient services.

Characteristic	Readmission only ($n = 11$)	Outpatient services only[a] ($n = 17$)	Readmission and outpatient services[a] ($n = 10$)	Total Sample ($n = 38$)
Sex				
Males	7 (64%)	8 (47%)	2 (20%)	17 (45%)
Females	4 (36%)	9 (53%)	8 (80%)	21 (55%)
Mean age in years (range)	40.4	38.1	35.7	38.1
Employment status[b]				
Employed	8 (73%)	10 (59%)	1 (10%)	19 (50%)
Unemployed	2 (18%)	7 (41%)	8 (80%)	17 (45%)
Marital status[b]				
Single	5 (45.5%)	10 (59%)	5 (50%)	20 (53%)
De facto/Married	5 (45.5%)	7 (41%)	4 (40%)	16 (42%)
Side of epileptogenic focus				
Left	8 (73%)	12 (71%)	7 (70%)	27 (71%)
Right	3 (27%)	5 (29%)	3 (30%)	11 (29%)
Length of follow-up				
$\leq$24m.	6 (54.5%)	3 (18%)	6 (60%)	15 (39.5%)
$>$24m.	5 (45.5%)	14 (82%)	4 (40%)	23 (60.5%)
Post-operative seizures				
No seizures/auras only	6 (55%)	11 (65%)	6 (60%)	23 (61%)
CPS &/or GTCS[c]	5 (45%)	6 (35%)	4 (40%)	15 (39%)

[a]Hospital outpatient and community support services additional to those routinely provided by the Seizure Surgery Follow-up and Rehabilitation Programme.

[b]Children under 18 years are not included in these data.

[c]These patients experienced complex partial seizures and/or generalized tonic–clonic seizures post-surgery.

cal demands placed on patients following the stressful, life-changing experience of seizure surgery[9–11]. Post-operatively, patients frequently describe an adjustment process which can involve a paradigmatic shift in the perceptions of self and others, as the patient's perceptions change from chronically ill to well. Alternatively, for patients whose seizure outcome is less than optimal, there may be a period of psychological readjustment surrounding the realization that surgery has not provided the 'ultimate cure'.

In our sample, difficulties with adjustment most commonly presented as anxiety or depression. This confers with earlier research performed by Bladin[9] as well as more recent research within our programme[11, 15, 16]. In contrast, one patient accounted for most of the readmissions relating to post-ictal psychosis (Table 2). This patient had a previous psychiatric history and extremely limited social support. In general, both of these factors predisposed patients in our sample to greater need of post-operative support, particularly additional outpatients services (Table 4).

Disrupted family dynamics also precipitated the need for additional outpatient services. Typically, this involved the provision of psychological counselling to patients experiencing marital conflict, arising from changing roles in their relationships. The 'seizure-free' patient may attempt to reduce dependence on a partner who has traditionally performed the role of 'carer'. In response, the partner may be unwilling to relinquish this role, as it has formed an intrinsic part of his/her sense of self-worth. Similar changes in relationship and family dynamics were noted by Bladin[9].

A limited social network also predisposed patients to require additional outpatient services post-ATL (Table 4). Our findings reveal therefore, that it is the *number* and *quality* of post-operative social supports available to the patient that is significant, rather than the nature of the relationships involved. This concurs with previous research by Sarason[17] into the psychologically important aspects of social support. Upton[18] has also found that it is the perceived support from both family and friends that contributes to emotional adjustment in patients with chronic epilepsy.

Epileptological factors frequently necessitated readmission and/or use of additional outpatient services. Readmission typically involved stabilization of post-operative seizures, or their recharacterization. In contrast, additional outpatient services were predominantly used to provide ongoing psychological and social support, to assist patients in coping with the psychosocial effects of ongoing seizures. In general, there was a greater percentage of patients experiencing post-operative seizures in the sample requiring additional post-operative support than in the larger sample of 100 patients. The findings reinforce, therefore, the adverse effects of subtherapeutic seizure surgery on patient outcome.

Of particular interest was the finding that patients beyond the 24-month post-operative period more frequently utilized additional outpatient services (82%), compared with patients receiving routine follow-up from the Seizure Surgery Follow-up and Rehabilitation Programme (18%; Table 3). This highlights the effectiveness of our programme in providing patients with

Table 4: Characteristic differentiating patients requiring readmission or additional outpatient services.

Group	Psychiatric history ($n = 17$)	Disrupted family dynamics ($n = 15$)	Limited social network ($n = 30$)
Readmission only	4 (24%)	4 (26.5%)	7 (23%)
Outpatient services only[a]	7 (41%)	7 (47%)	14 (47%)
Readmission and outpatient services[a]	6 (35%)	4 (26.5%)	9 (30%)

[a]Hospital outpatient and community support services additional to those routinely provided by the Seizure Surgery Follow-up and Rehabilitation Programme.

ongoing medical and psychosocial support, and potentially preventing readmissions to the acute hospital system. The pattern of increased use of psychological support services in non-programme patients is of particular significance considering that the need for services would be expected to decrease over time, rather than increase. In contrast, the running costs of the follow-up programme are relatively minor and the benefits substantial, supporting the viability of such a service.

We have previously stressed the importance of a follow-up and rehabilitation programme that maintains regular clinical contact with post-surgical patients[9, 11, 15, 16]. Psychological issues and associated psychiatric diagnoses can produce significant post-operative distress if left unchecked, and may potentially culminate in traumatic circumstances surrounding acute patient readmission. In contrast, a follow-up and rehabilitation programme can provide ongoing education on the psychosocial aspects of post-operative adjustment, thereby minimizing or preventing significant psychological distress. Where difficulties arise, appropriate treatment can be implemented, potentially avoiding the need for acute readmission.

The Seizure Surgery Follow-up and Rehabilitation Programme has adopted a multidisciplinary approach to the treatment of post-operative psychological issues, including anxiety and depression. Pharmacotherapy is prescribed, where necessary, in conjunction with psychological interventions, such as cognitive behaviour therapy. Regular phone follow-up by specialist nursing staff also clearly indicates to the patient and their family that they will not be left to struggle with post-operative psychological difficulties on their own.

Clearly, patients beyond the 2-year follow-up period may require ongoing psychological support. This cannot be sustained by the current acute health care system within Australia, highlighting the need for careful planning and management of long-term patient outcome. Ensuring ongoing community supports is one possible way of reducing the demands on the acute hospital system, including the need for post-operative readmission. Furthermore, to combat the effects of a limited social network, our Follow-up and Rehabilitation Programme has recently established a range of socialization strategies and a community linkage system. This is pre-operatively planned for patients, where necessary, and then implemented in the post-operative phase.

Post-operative employment status was also found to contribute to the incidence of readmission and/or additional outpatient services accessed by patients. Unemployed patients were more likely to be readmitted and require additional outpatient services (80%), than employed patients (10%). In contrast, employed patients predominantly required readmission only. Male patients also tended to require readmission only, in comparison with females who typically required both readmission and additional outpatient services. On examining reasons for readmission, employed male patients were predominantly readmitted for post-operative complications and/or unrelated medical conditions. This probably accounts for the greater incidence of readmission only in this group.

The Seizure Surgery Follow-up and Rehabilitation Programme has recently incorporated vocational counselling and access to post-operative retraining into the routine programme. This has been achieved through regular contact with representatives from state and federal employment services. Where appropriate, patients receive pre-operative vocational counselling, including the development of a pre-operative vocational plan, which is then implemented in the post-operative phase. This is consistent with recent research showing that further education post-ATL improves work outcome[19].

CONCLUSIONS

A range of 'risk' factors can be identified to profile patients most in need of additional support post-ATL. In particular, patients who were female or unemployed required the greatest level of post-operative support, including readmission and additional outpatient services. Readmission alone typically occurred for males or employed patients. Utilization of additional outpatient services was common in patients with a previous psychiatric history, limited social networks and/or patients experiencing disrupted family dynamics. Length of post-operative follow-up was also a significant factor.

It is important to acknowledge that these 'risk' factors commonly occur in tandem. This highlights the need for careful team planning pre-operatively to identify relevant risk issues in order to implement proac-

tive management strategies for the rehabilitation phase. Our Seizure Surgery Follow-up and Rehabilitation Programme has been presented as a model for reducing the demands placed on the acute hospital system.

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